

# **NOAA Joint Hurricane Testbed Program**

**Near-real-time sea surface wave field and rain rate data  
from the NOAA Wide Swath Radar Altimeter (WSRA)  
for operational use by hurricane forecasters**

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1998-2005 NASA Scanning Radar Altimeter (SRA) flew on NOAA P-3 – post-flight data analysis took months to years

ProSensing built Wide Swath Radar Altimeter (WSRA) under NOAA SBIR program – digital beam forming and pulse compression

**Joint Hurricane Testbed (JHT)** brings WSRA to operational status during the 2010 hurricane season

## **Processing WSRA data on the fly**

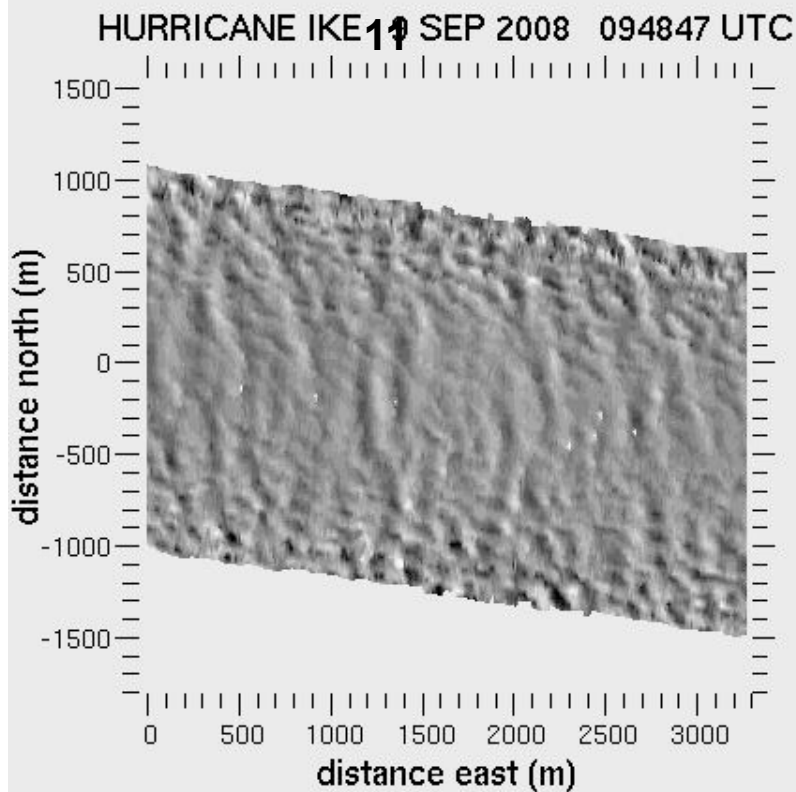
Every 15 minutes during flights, accumulated data are processed into sea surface topography and directional wave spectra.

Wave field parameters are extracted and transmitted to NHC along with the spectra.

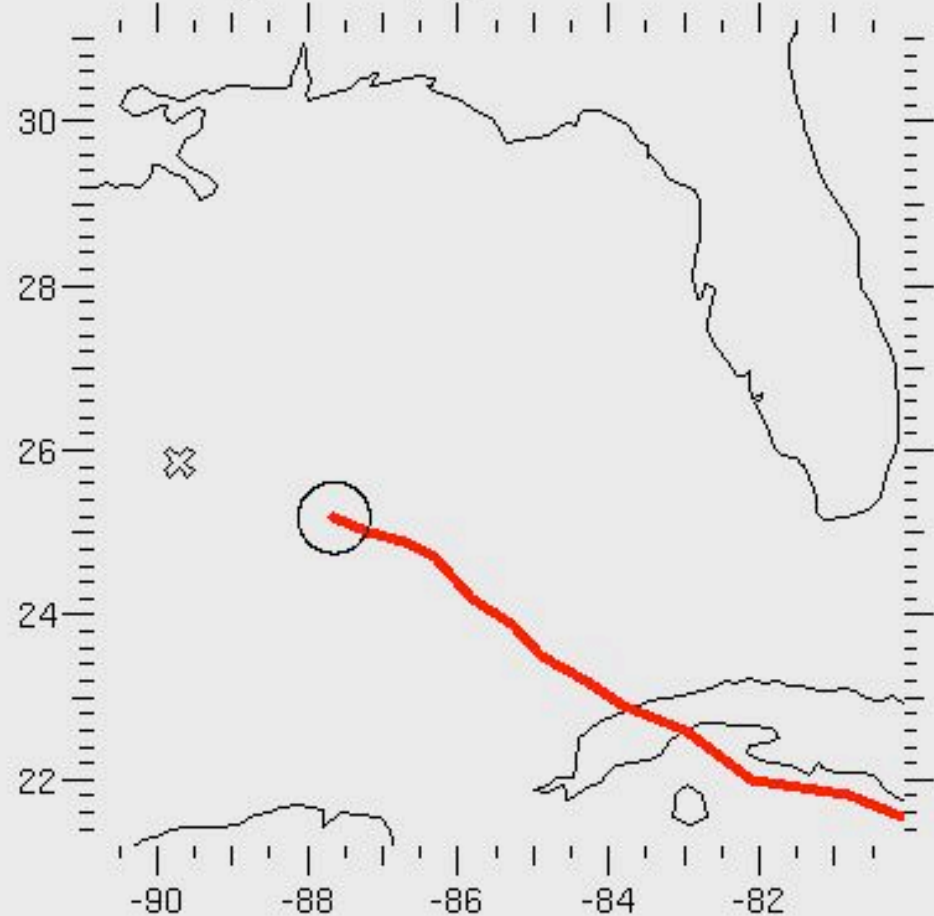
WSRA application running on the **JHT** server displays data products on NMAP2 within the NAWIPS environment for use by forecasters.

System : 1 ( -84.2539, 21.2034)

System : 0 ( 0.6940, 0.3508)

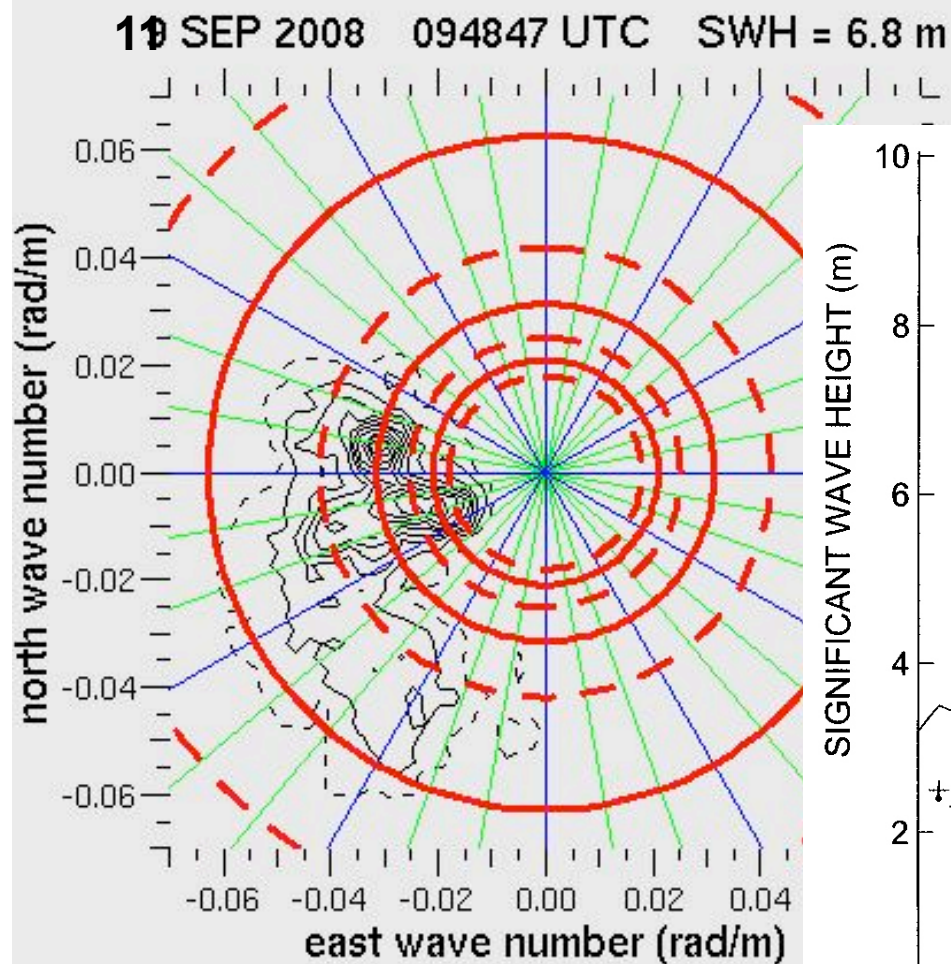


WSRA & buoy 42001 (x), HURRICANE IKE RMW (o)

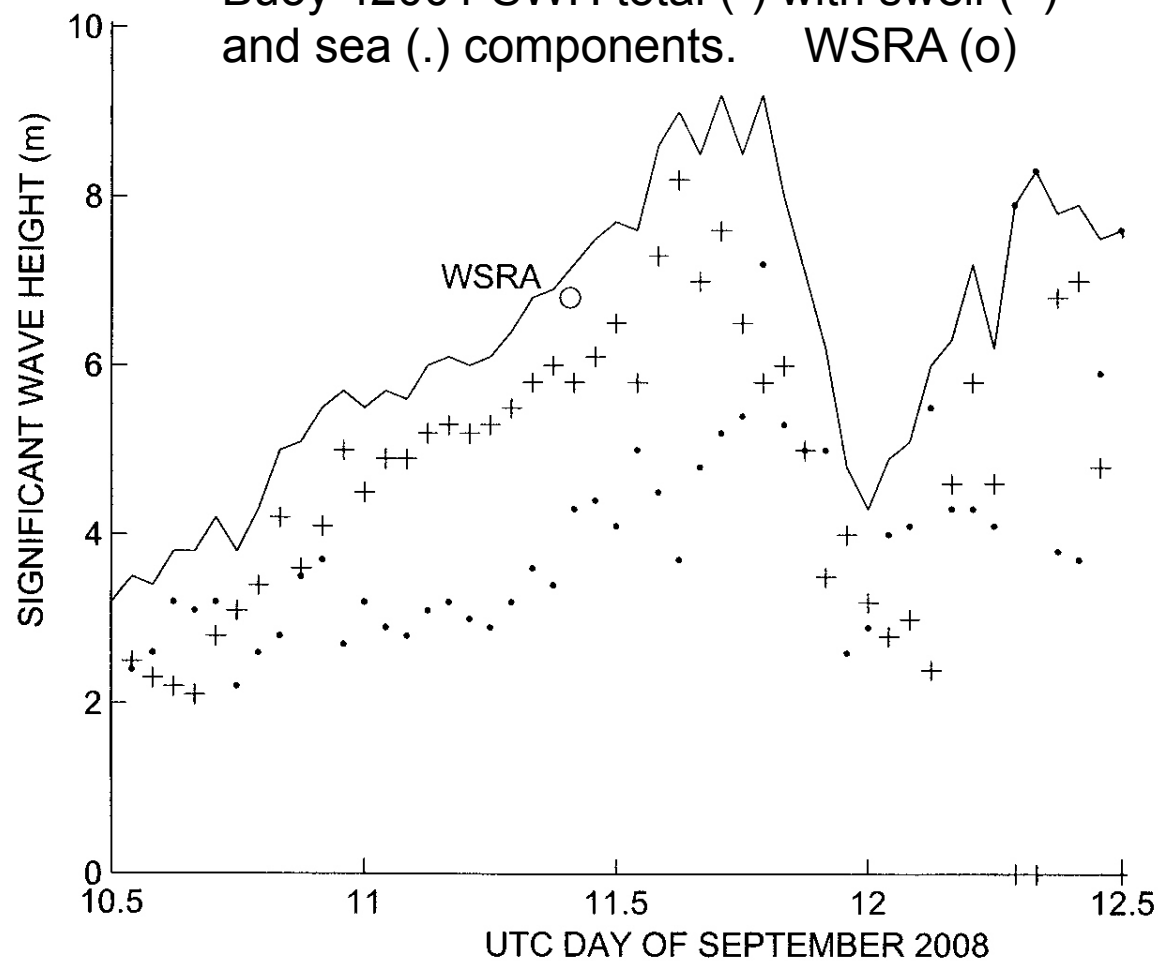


Bimodal wave field: (1) swell from radius of maximum wind propagating west, (2) wind-driven waves propagating south-southwest.

System : 0 ( 0.1165, 0.3620)

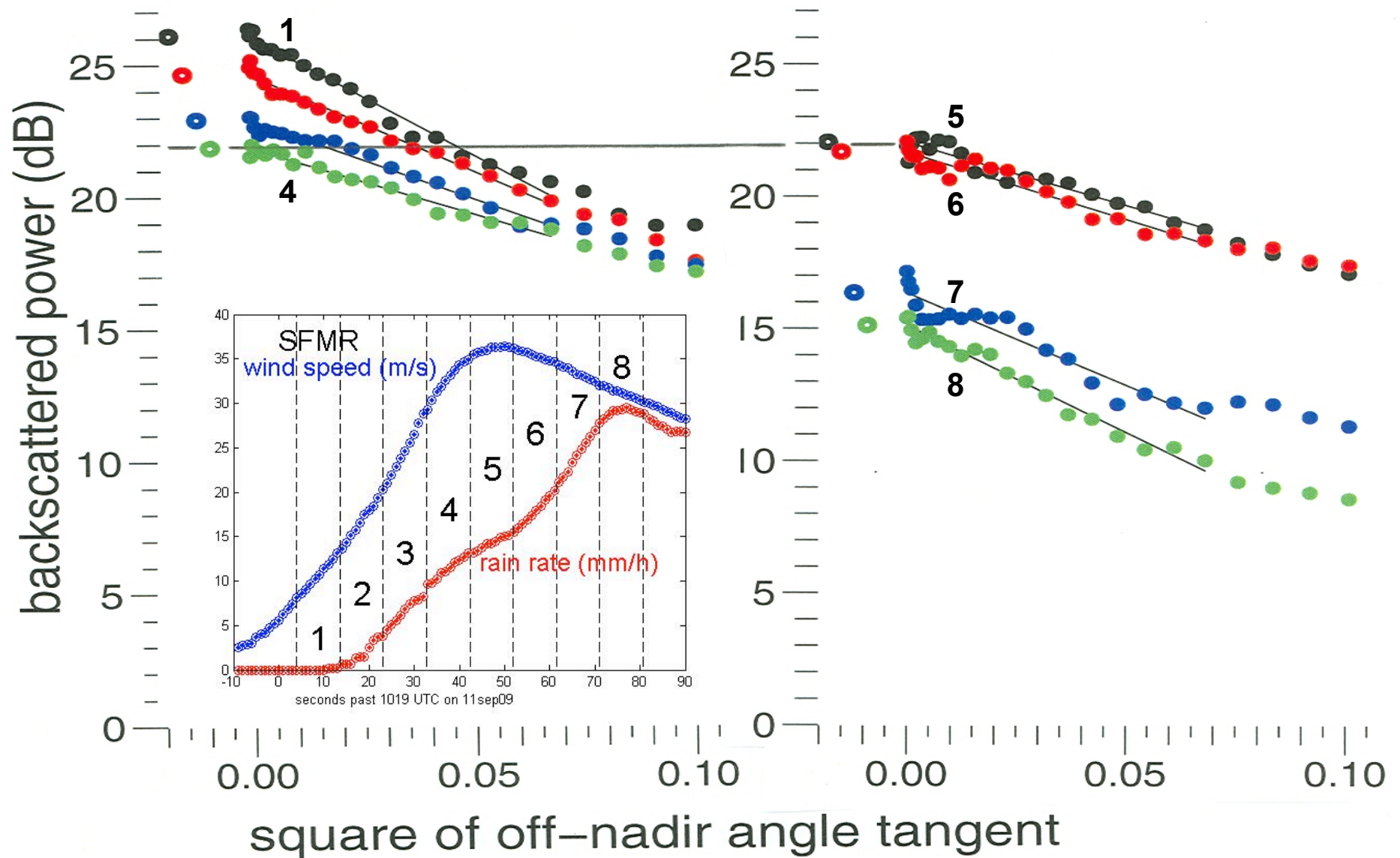


Buoy 42001 SWH total (-) with swell (+) and sea (.) components. WSRA (o)



# NOAA WSRA backscattered power measurements

Hurricane Ike 11 SEP 2008



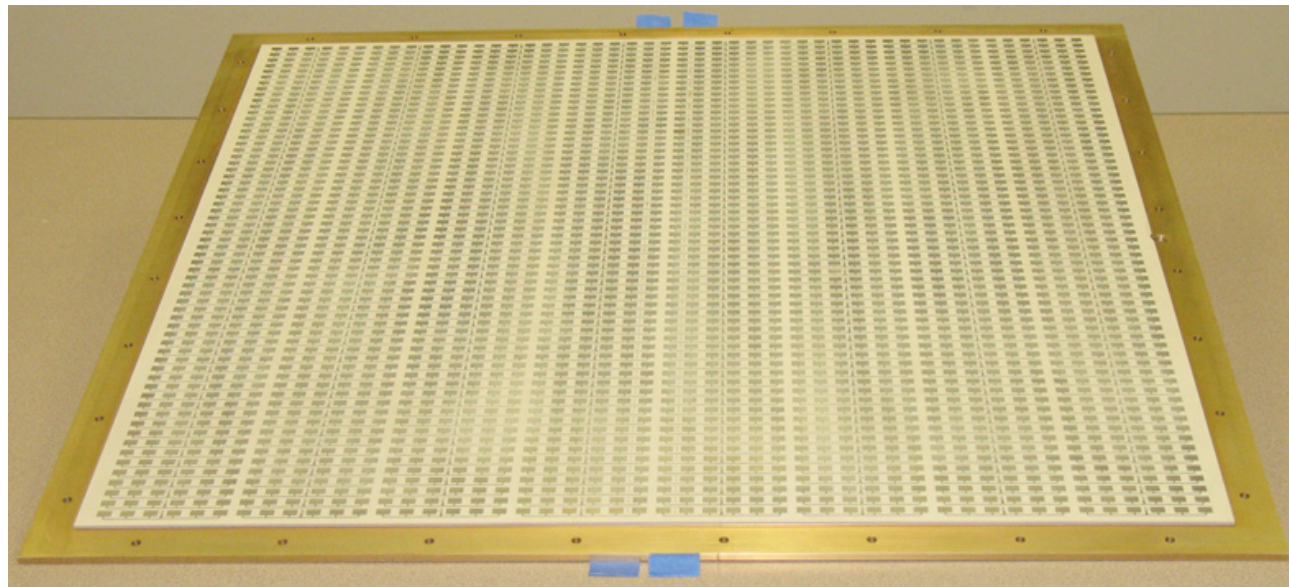




NASA Scanning Radar Altimeter (SRA)

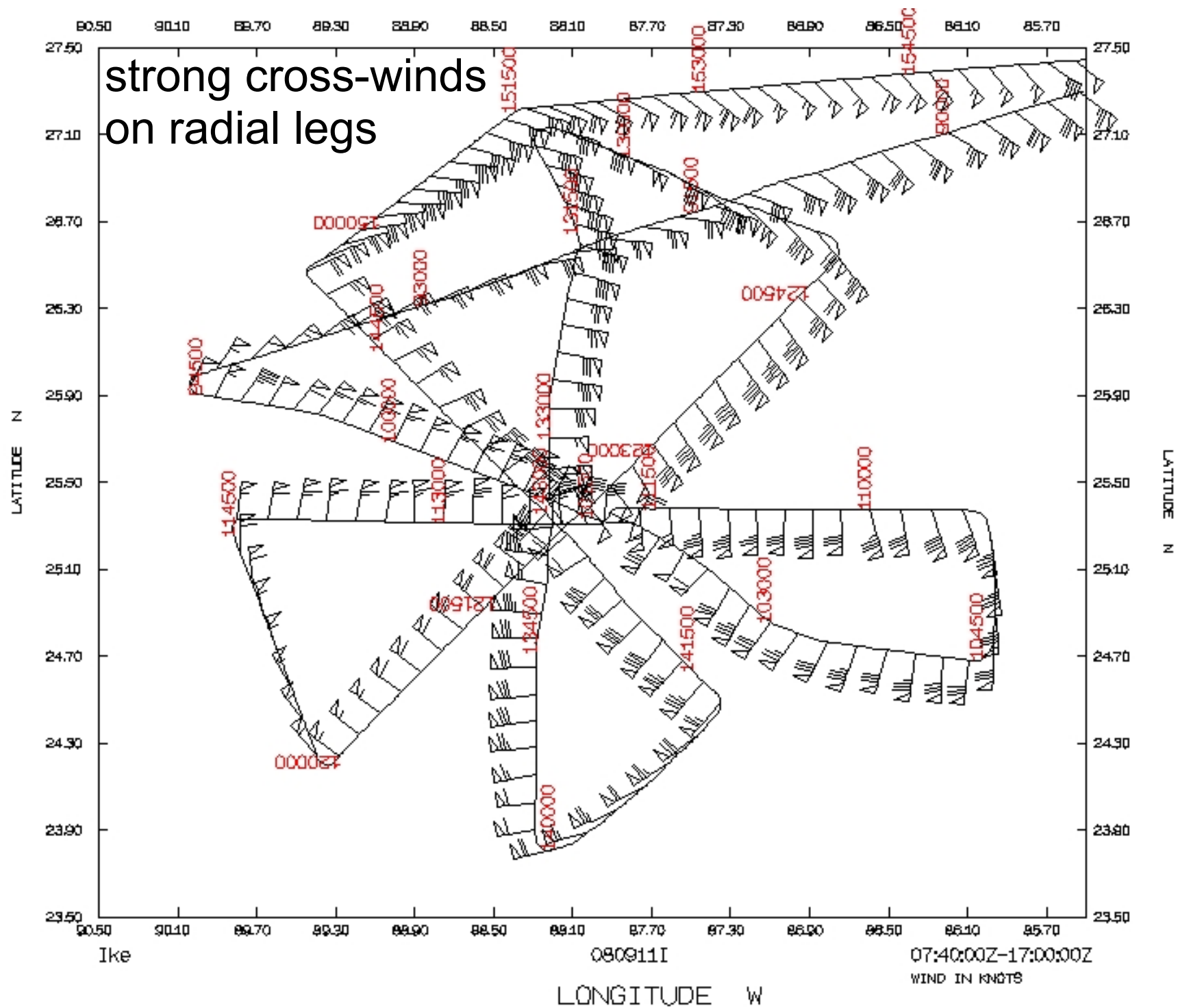
A photograph showing the NASA Scanning Radar Altimeter (SRA) mounted on the underside of an aircraft wing. The SRA is a large, white, curved, cylindrical structure with a central, smaller, white, conical antenna. The wing is light-colored with visible rivets along the leading edge. The background shows a blue sky with white clouds and a palm tree.

**NOAA  
Wide  
Swath  
Radar  
Altimeter  
(WSRA)**

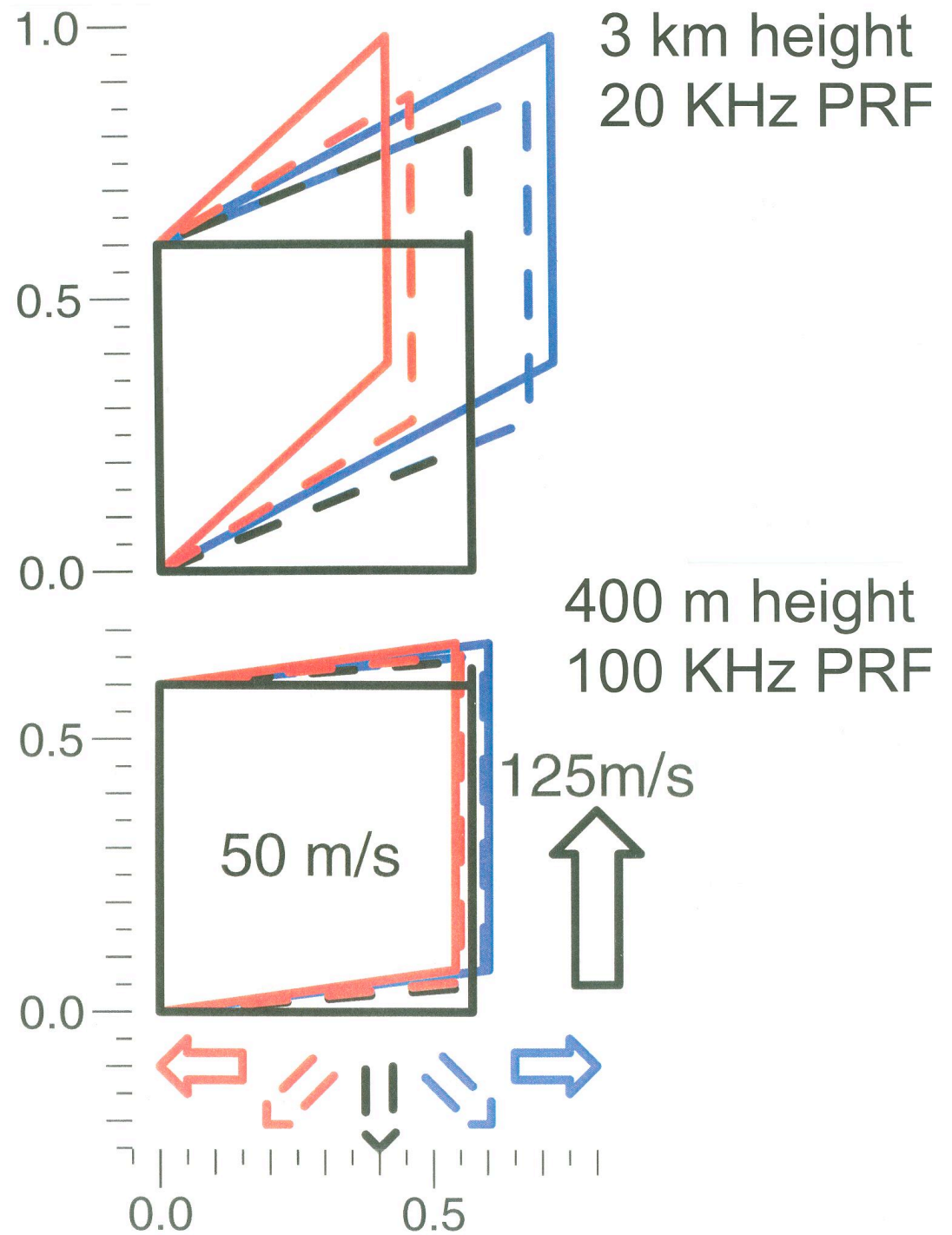
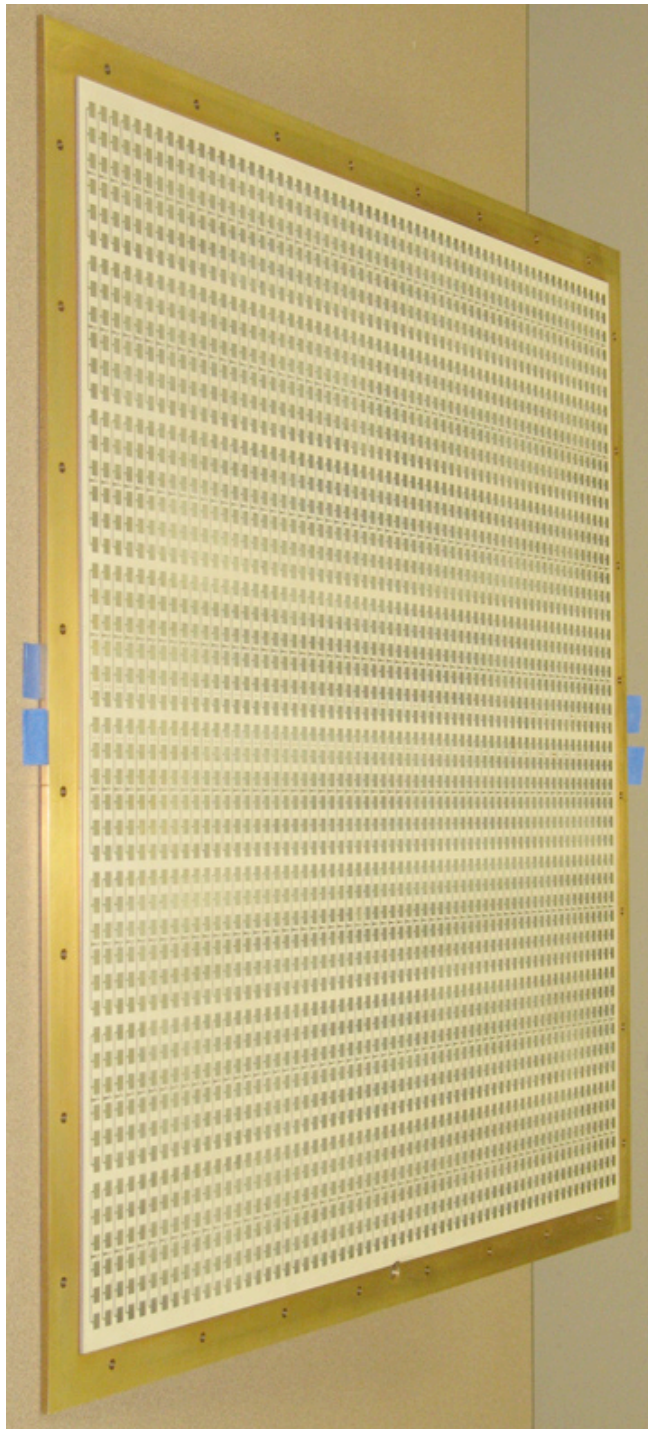


More complex but much lighter so the antenna could be mounted on a wing pod on NOAA P-3 or AFR C-130 aircraft.





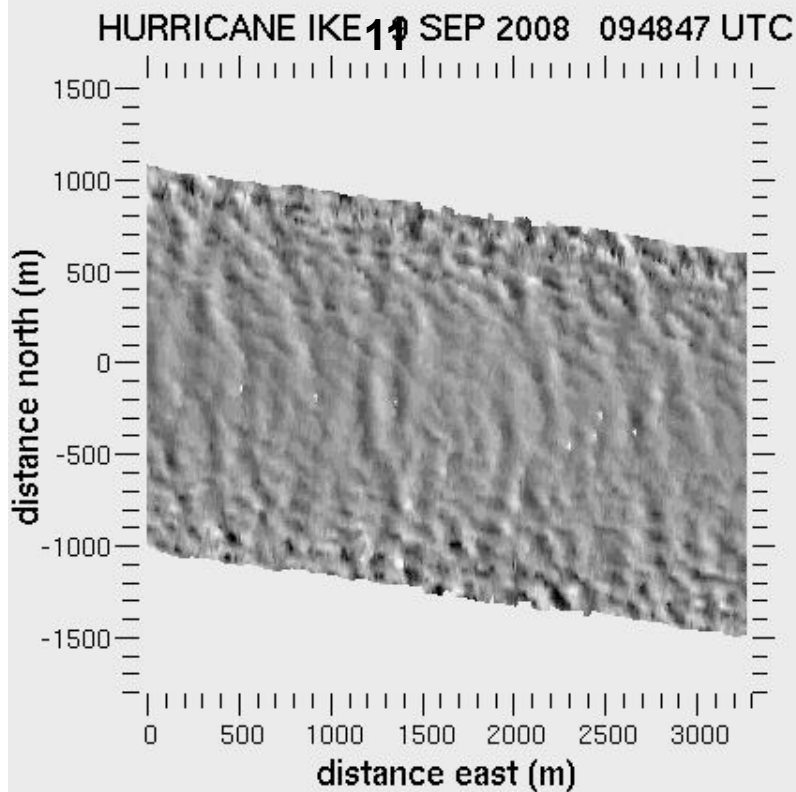
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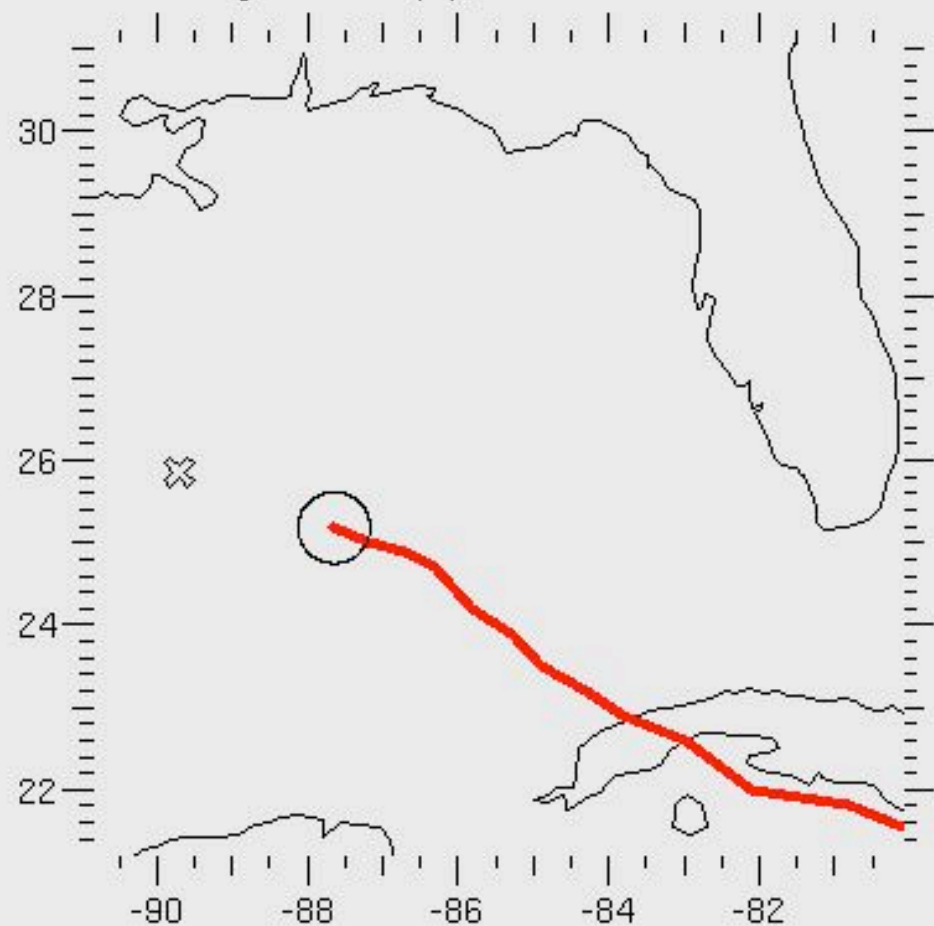


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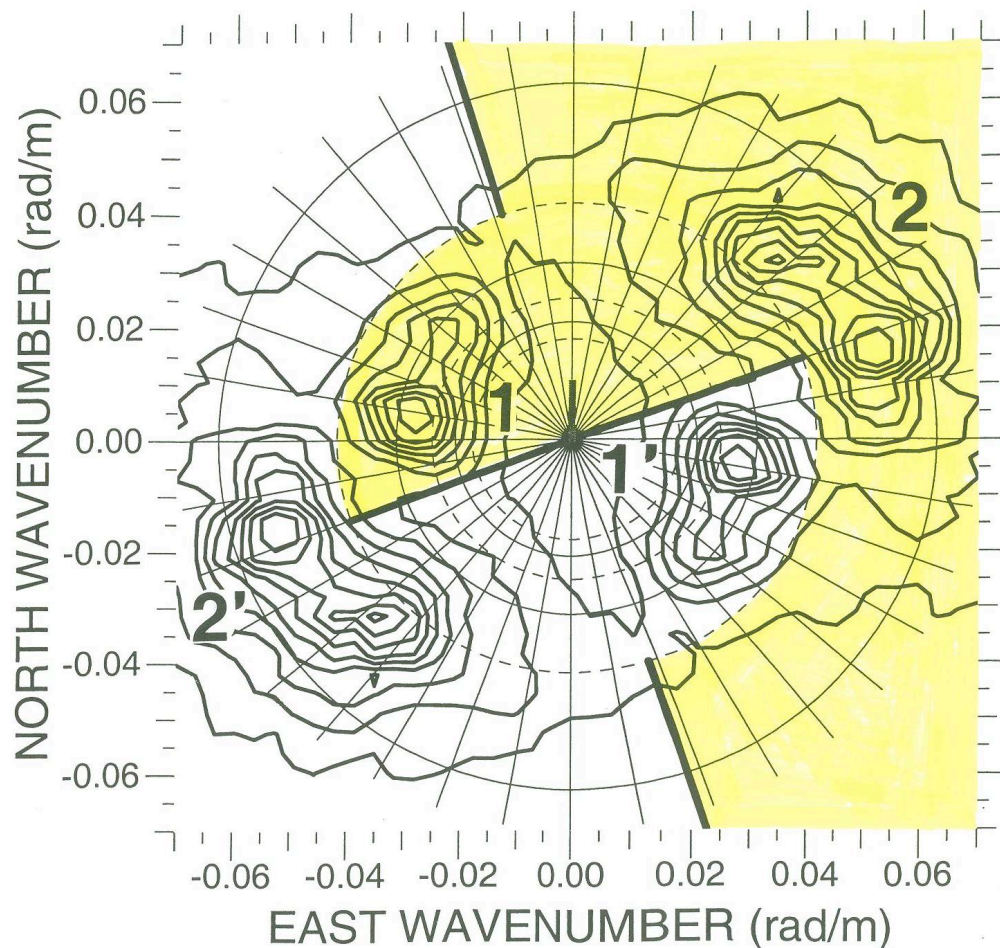


WSRA & buoy 42001 (x), HURRICANE IKE RMW (o)

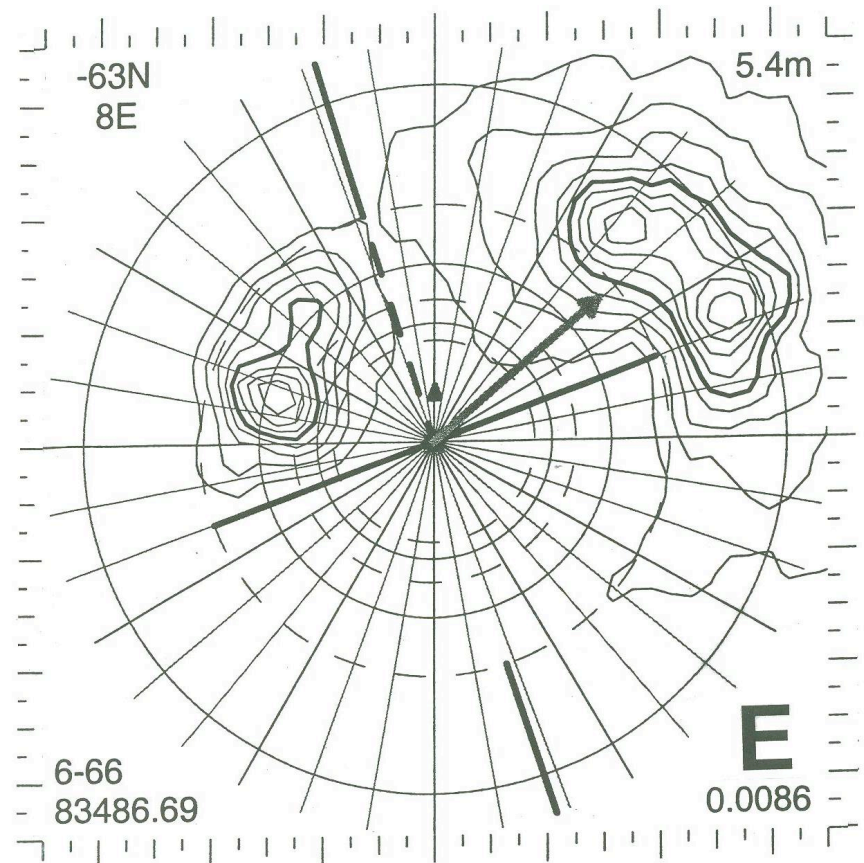


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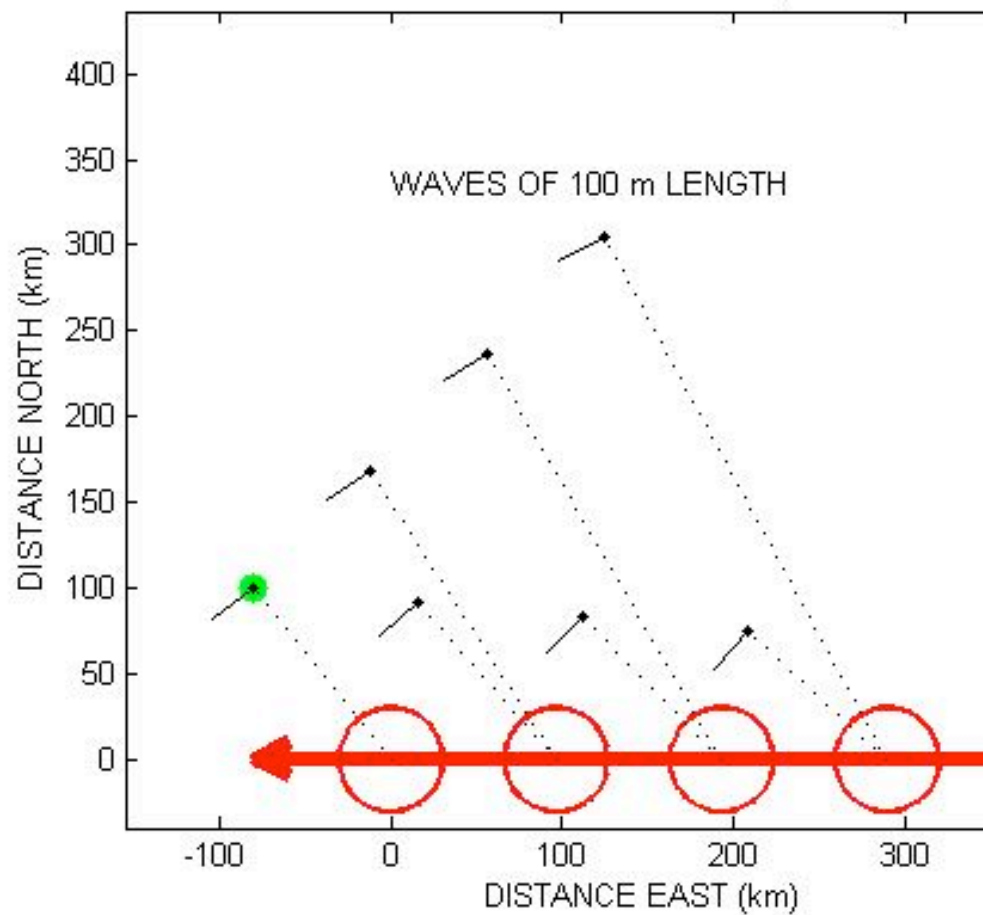
Applying a 2-dimensional FFT to wave topography produces an encounter wave spectrum that has both the real spectral components (yellow) and opposite propagating artifact lobes.



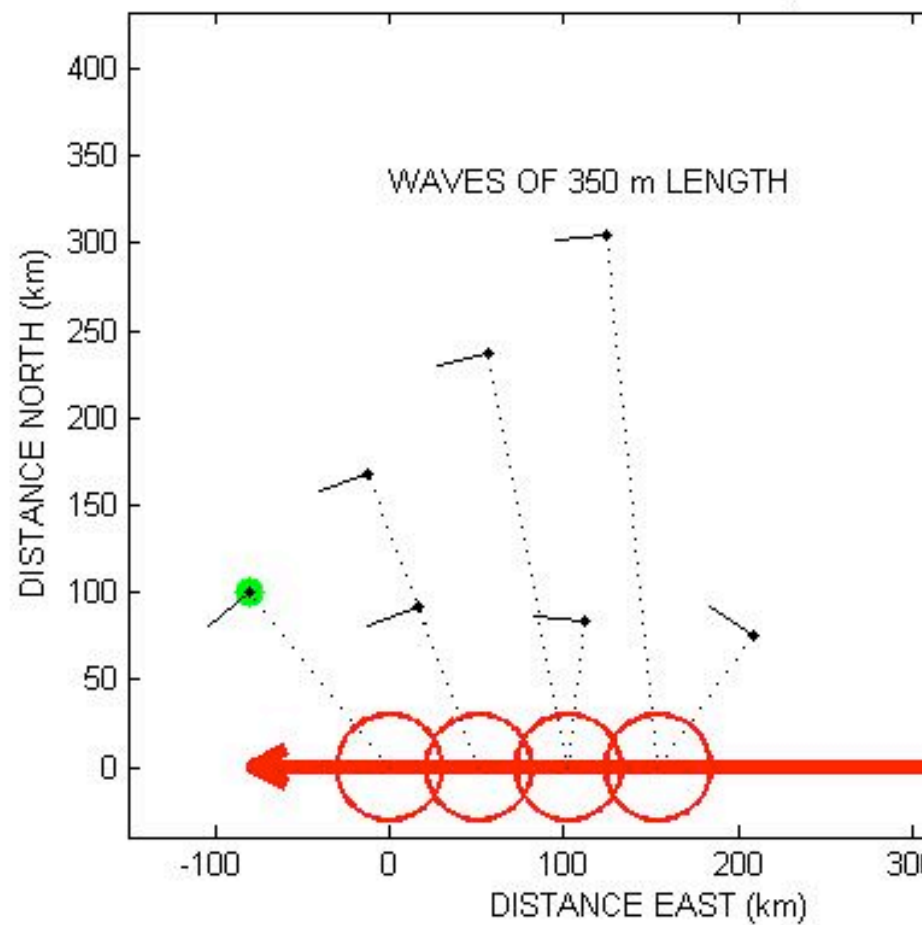
Artifact lobes must be deleted and the real components Doppler-corrected to arrive at the sea surface directional wave spectrum.



c:\data\sra\noaasra\ucompo.m



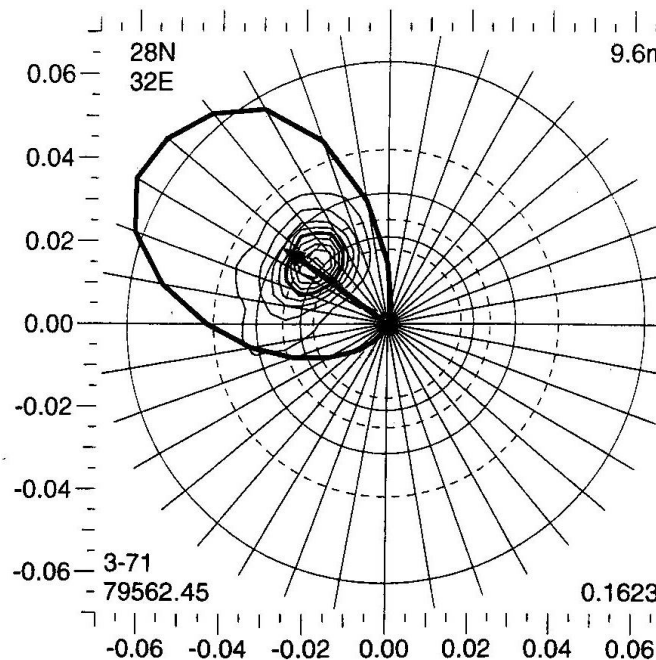
c:\data\sra\noaasra\ucompo.m



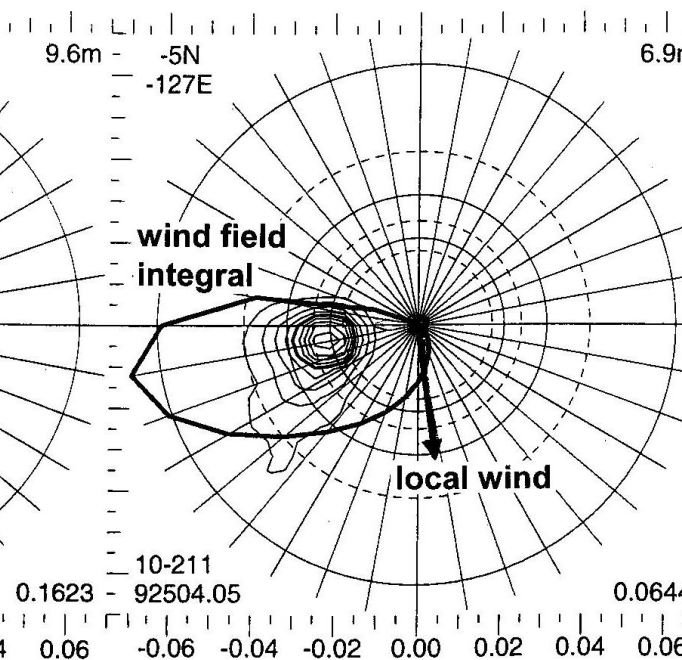


Integrating the spatial/temporal variation of the wind field based on eye fixes can automatically identify the real spectral components, whether they are:

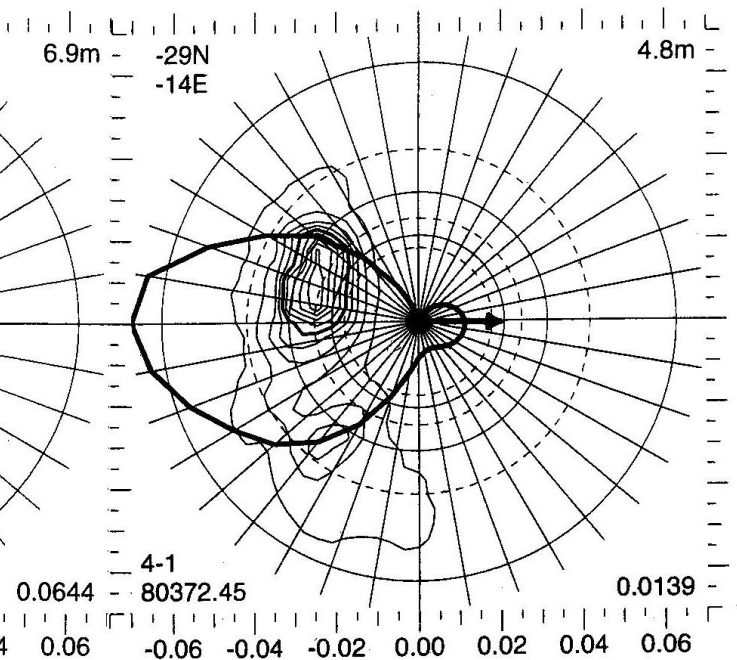
propagating in the  
local wind direction



propagating at an angle  
to the local wind



propagating opposite  
the local wind



**The NOAA WSRA also has the potential to provide targeted measurements of storm surge for landfalling hurricanes.**